**Unit Test Analysis- Electrochemistry SCH4U**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test**  **Question**  **Number** | **Ministry Expectations (See below for complete listing)** | | | | | | | | | | | | | |
|  | F1.1 | F1.2 | F2.1 | F2.2 | F2.3 | F2.4 | F2.5 | F2.6 | F3.1 | F3.2 | F3.3 | F3.4 | F3.5 | F3.6 |
| 1 |  |  | √ |  |  |  |  |  | √ |  |  |  |  |  |
| 2 |  |  | √ |  |  |  |  |  | √ |  |  |  |  |  |
| 3 |  |  | √ |  |  |  |  |  | √ |  |  |  |  |  |
| 4 |  |  | √ |  |  |  |  |  | √ |  |  |  |  |  |
| 5 |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |
| 6 |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |
| 7 |  |  | √ |  |  |  |  |  | √ |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 9 |  |  | √ |  |  |  |  |  |  | √ |  |  |  |  |
| 10 |  |  |  |  |  |  |  |  |  | √ |  |  |  |  |
| 11 |  |  |  |  |  |  |  |  |  |  |  |  | √ |  |
| 12 |  |  |  |  |  |  |  |  |  | √ |  |  |  |  |
| 13 |  |  | √ |  |  |  |  |  | √ |  |  |  |  |  |
| 14 |  |  |  |  | √ |  |  |  |  |  |  |  |  |  |
| 15 |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |
| 16 |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  |  | √ |  |  |  |  |  |  |  |  |  |  |  |
| 18 |  |  |  |  | √ |  |  |  |  |  |  |  |  |  |
| 19 |  |  |  |  | √ |  |  |  |  |  |  |  |  |  |
| 20 |  |  | √ |  |  |  |  |  |  | √ |  |  |  |  |
| 21 |  |  |  |  |  |  | √ |  |  | √ | √ |  |  |  |
| 22 |  |  |  |  |  |  |  | √ |  |  | √ |  |  |  |
| 23 |  |  |  |  |  |  |  |  |  |  |  |  | √ |  |
| 24 |  |  |  |  |  |  |  |  |  |  |  |  | √ |  |
| 25 |  |  |  |  |  |  |  |  |  |  |  | √ |  |  |
| 26 | √ |  |  |  |  |  |  |  |  |  |  |  | √ |  |
| 27 |  |  |  |  |  |  |  |  |  |  |  |  |  | √ |

**Ministry Expectations**

**F1.** analyse technologies and processes relating to electrochemistry, and their implications for society, health and safety, and the environment;

**F2**. investigate oxidation-reduction reactions using a galvanic cell, and analyse electrochemical reactions in qualitative and quantitave terms;

**F3.** demonstrate an understanding of the principles of oxidation-reduction reactions and the many practical applications of electrochemistry.

**F1.1** assess, on the basis of research, the viability of using electrochemical technologies as alternative

sources of energy (e.g., fuel cells for emergency power generation or as power sources in remote locations), and explain their potential impact on society and the environment [IP, PR, AI, C]

**F1.2** analyse health and safety issues involving electrochemistry (e.g., corrosion of metal pipes in drinking water systems) [AI, C]

**F2.1** use appropriate terminology related to electrochemistry, including, but not limited to:

*half-reaction, electrochemical cell, reducing agent, oxidizing agent, redox reaction,* and *oxidation number* [C]

**F2.2** conduct an inquiry to analyse, in qualitative terms, an oxidation-reduction (redox) reaction[PR, AI, C]

**F2.3** write balanced chemical equations for oxidation-reductions, using various methods including oxidation numbers of atoms antd the half-reaction method of balancing [AI, C]

**F2.4** build a galvanic cell and measure its cell potential[PR, AI]

**F2.5** analyse the processes in galvanic cells, and draw labeled diagrams of these cells to show the oxidation or reduction reaction that occurs in each of the half-cells, the direction of electron flow, the electrode polarity (anode and cathode), the cell potential, and the direction of the ion movement[AI, C]

**F2.6** predict the spontaneity of redox reactions, based on overall cell potential as determined using a table of standard reduction potentials for redox half-reactions[AI]

**F3.1** explain redox reactions in terms of the loss and gain of electrons and the associated change in oxidation number

**F3.2** identify the components of a galvanic cell. Explain how each component functions in a redox reaction

**F3.3** describe galvanic cells in terms of oxidation and reduction half-cells whose voltages can be used to determine overall cell potential

**F3.4** explain how the corrosion of metals in terms of an electrochemical process, and describe some common corrosion-inhibiting techniques (e.g., painting, galvanizing, cathodic protection)

**F3.5** explain some applications of electrochemistry in common industrial processes (e.g., in refining metals such as aluminum and zinc; in the production of hydrogen)

**F3.6** explain the corrosion of metals in terms of an electrochemical process, and describe some common corrosion-inhibiting techniques (e.g., painting, galvanizing, cathodic protection)

**Electrochemistry**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test Question number | Question Type | Achievement chart | | | |
|  |  | Knowledge and Understanding | Thinking and Inquiry | Communication | Application |
| #1-3 | True/False | √√√1-3 |  |  |  |
| #4-14 | Multiple choice | √√√√√√√√√√√4-14 |  |  |  |
| #15-17 | Completion | √√√√15  √16  √17 |  |  |  |
| #18-27 | Short answer |  | √√√√18  √√19  √√√√√√√20  √√√√√√21  √√√√22 | √√√√23  √√24  √√√25  √√26  √√27 | √√√24  √√25  √√26  √√√√√√27 |
| Total Marks |  | 20 | 23 | 13 | 13 |

Legend:

√ - one mark